Effects of small- sided game based conditioning versus general conditioning on physical fitness and physiological variables of female soccer players

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Chapter-I

Introduction

Football

Football is the most popular sports on the planet. More than 200 million people worldwide play more than 20 million football games each year. The reasons for soccer's universal appeal rest with the nature of the game. Football is common language among people of diverse back grounds and heritages, a bridge that spans economic, political cultural and religious barriers known as "football" throughout most of the world, soccer is the national sport of nearly every country in Asia, Africa, Europe and South Africa (Joseph, A. Luxbacher 1966).

Football is probably the most popular sport in the world. Despite its universal nature and its formal history extended back over a hundred years, there are still many uncertainties concerning its multidimensional requirements (physiological, psychological, biomechanical) and therefore uncertainties when planning for optimal training and conditioning. In fact, this game is very complex because the pitch is substantially
large.

Football is a game of physical and mental challenges. One must execute skilled movements under generalized conditions of restricted space, limited time, physical and mental fatigue, and opposing players. One must be able to run several miles during a game, mostly at sprint like speed and respond quickly to a variety of rapidly changing situations during play. Finally, you need a thorough understanding of individual, group and team tactics. Our ability to meet challenges determines how well one performs on the football field. It is a game which calls for strenuous continuous thrilling action and therefore, appeals to the youth the world over. The skill involved in the game are simple, nature and satisfying to anyone who participating in the game.

Training methods

Training methods have evolved from conditioning exercises without the ball that develop physical capacities (Bangsbo, 1994), to new methods and exercises which are able to simultaneously improve physical capacities along with technical and tactical skills, specific to the demands of modern soccer matches. Small-sided games (SSGs), alsoreferred to as skill-based conditioning games (Gabbett, 2006), game-based training (Gabbett, Jenkins, & Abernethy, 2009) or small-sided and conditioned games (Davids, Araújo, Correia, & Vilar, 2013) are modified games played on smaller fields, with

adapted rules and involving a number of players often lower than traditional soccer games (Hill-Haas, Dawson, Impellizzeri, & Coutts, 2011).

Skill-based exercises are considered to be the most effective training model that allows young, non-specialised players to develop technical skills and more skilled athletes to refine and maximise their skills. High-intensity, intermittent training is considered an effective alternative model to traditional endurance training that can produce similar or even superior effects on a range of skeletal muscle and metabolic adaptations.

Small -sided games(SSG)

Small-sided games allow the integrated training of the technical and tactical aspects fundamental to the development of young soccer players. The variability in movement during SSGs contributes to the development of a more generalized motor program to cope with a variety of similar but different situations (see Williams and Hodges, 2005, for a review). In addition, their structure and organization allow them to be used freely by any group of young people on any surface or space of play (e.g., street football), favoring the development of skills essential for long-term development. However, above all, they allow for engagement in activities deliberately designed to improve football performance. Evidence suggests that deliberate practice is more likely to lead to elite status when compared with more generic football-related activities and SSGs contribute to this specific area of talent development (Ford, Ward, Hodges, & Williams, 2009; Sarmento, Anguera, Pereira, & Araújo, 2018; Ward, Hodges, Starkes, & Williams, 2007).

Small-sided games effectively integrate the specific demands of soccer match-play and represent a useful solution. With the increased use of SSG as a training method, the scientific community devoted greater attention to them. In fact, we found recent studies with conclusions which suggest that physiological responses (e.g. heart rate, blood lactate concentration and rating of perceived exertion) and technical/skill requirements can be modified during SSG in soccer by altering factors such as the number of players, the size of the pitch, the rules of the game, and coach encouragement (Casamichana and Castellano, 2010). Since there are very few studies which have been conducted on female youth football players, the scholar took keen interest in observing the effect of small- sided game based conditioning versus general conditioning on physical fitness variables of female youth players.

Statement of the problem

The title of the study may be stated as **"Effects of Small- Sided Game Based Conditioning versus General Conditioning on Physical Fitness and Physiological Variables of Female Soccer Players"**

Objectives of the study:

1. To assess the effect of small sided game based conditioning on selected physical fitness variables of female soccer players.
2. To assess the effect of small sided game based conditioning on selected physiological variables of female soccer players.
3. To assess the effect of general conditioning on selected physical fitness variables of female soccer players.
4. To assess the effect of general conditioning on selected physiological variables of female soccer players.
5. To compare small sided game conditioning and general conditioning by determining which one has a greater impact on selected physical fitness variables.
6. To compare small sided game conditioning and general conditioning by determining which one has a greater impact on selected physiological variables.

Hypotheses:

Based on the available related literature, it may be hypothesized that:

1. Small sided game based conditioning will significantly affect the selected physical fitness variables of female soccer players.
2. Small sided game based conditioning will significantly affect the selected physiological variables of female soccer players.
3. General conditioning will significantly affect the selected physical fitness variables of female soccer players.
4. General conditioning will significantly affect the selected physiological variables of female soccer players.
5. There will be significant difference on comparing small sided game conditioning and general conditioning on selected physical fitness variables.
6. There will be significant difference on comparing small sided game conditioning and general conditioning on selected physiological variables.

Delimitations of the study:

The delimitations of the study will be:

1. The study will be delimited to thirty female soccer players of Lakshmibai National University of Physical Education, Gwalior (M.P.).
2. The study will be delimited to female soccer players who had participated in senior national (Football).
3. The subjects will be classified into two groups that are experimental group 1 and experimental group 2 and their age range for the study was from 18 to 25 years.
4. The study will be further delimited to small-sided games based conditioning and general conditioning of female soccer players.

Limitations of the study:

1. The dietary habits, living conditions, economic conditions and recovery methods adopted by the subjects will be considered as limitation of the study.
2. The motivation level, understanding about the tests will also be considered as limitations of the study.

Definition and Explanation of the Terms

Small-sided games – Small-sided games (SSGs) are entertaining, movement-based scenarios used for sport instruction and training. They have fewer players per team, are played on smaller fields, and have rules that are intentionally changed based on the objectives to be met while still adhering to the fundamentals of the game. Martins, F.M.; Mendes, F.M.; Clemente, F.M. (2014)

Physical fitness – One's ability to execute daily activities with optimal performance, endurance, and strength with the management of disease, fatigue, and stress and reduced sedentary behavior.

General conditioning – The development of the essential elements of energy production and expenditure that are not task- or exercise-specific is referred to as general conditioning. This implies that this region of conditioning can be developed through activities that are neither metabolically or biomechanically similar to the competitive sport and associated abilities.

Significance of the study:

1. The study will provide the awareness about selected physical fitness and physiological variables.
2. This study will provide improvement in physiological and motor fitness variables through similar training of male soccer players studying in different universities.
3. This study might be useful to the physical educationists, coaches and the players to use as an initial device for developing physical fitness, game skill and playing ability.
4. The findings of the study will highlight the importance of small-sided games based conditioning for the overall playing ability of football players.
5. It may also promote and create innovative movements in coaching and training for further research in football.

Chapter II

Review of Related Literature

Mustafa Karahan (2020); this study aimed to compare the effectiveness of skill- based training (SBT) at maximum intensity versus the small-sided game (SSG) on the physical performance characteristics of young soccer players during the pre-season period. Twenty-two male soccer players (mean age 15.3 ± 3 years) were randomly assigned to either an SBT or SSG fully controlled intervention programme, running parallel for eight weeks and held twice a week. On three non-consecutive days before and after training players completed a test battery consisting of the 20 m sprint, T-run, countermovement jump, running anaerobic sprint test (RAST) and 20 m shuttle run. Data were analyzed with a two-way ANOVA test for repeated measures. SBT and SSG interventions induced a significant improvement in the anaerobic power (10.9% vs 6.2%), explosive power (8.5% vs 5.6%), VO2max (6.7% vs 6.5%) and vertical jump (5.3% vs 2.9%), respectively. The results of the present study suggest that SBT at maximum intensity may be more effective than SSG in improving the physical performance characteristics of young soccer players in the pre-competitive season.

Ramirez-Campillo, R, Alvarez, C, et.all. (2020); The study titled "Sequencing effects of plyometric training applied before or after regular soccer training on measures of physical fitness in young players" published in J Strength Cond Res 34(7): 1959–1966, 2020, aimed to evaluate the impact of a short-term (7 weeks) plyometric jump training regimen conducted either prior to (PJT-B) or following (PJT-A) soccer practice on various physical fitness components in adolescent soccer players. A single-blind randomized controlled trial was implemented, involving postpubertal males with an average age of 17.0 ± 0.5 years, who were divided into three groups: PJT-B (n = 12), PJT-A (n = 14), and a control group (CON; n = 12). The assessment metrics included evaluations of 20-meter sprint speed, standing long jump (SLJ), squat jump (SJ), countermovement jump (CMJ), drop jump (DJ), 20-meter multistage shuttle run endurance (MSSRT), and Illinois change-of-direction speed (ICODT). While the control group engaged in soccer-specific training, both PJT groups participated in similar soccer sessions, substituting approximately 11% of their training time with plyometric exercises. The PJT-B group executed plyometric activities following a warm-up, whereas the PJT-A group performed these exercises roughly 10 minutes after completing their soccer training. Variance analyses were conducted to identify differences among groups in all pre- and post-training assessments. Significant main

effects of time (all $p < 0.01$; $d = 0.19–0.79$) and group × time interactions (all $p \leq 0.05$; $d = 0.17–0.76$) were noted across all variables analyzed. Post hoc evaluations indicated notable improvements in the PJT-B group (SLJ: 9.4%, $d = 1.7$; CMJ: 11.2%, $d = 0.75$; 20-m MSSRT: 9.0%, $d = 0.77$) and the PJT-A group (SLJ: 3.1%, $d = 0.7$; CMJ: 4.9%, $d = 0.27$; 20-m MSSRT: 9.0%, $d = 0.76$). Additionally, the PJT-B group exhibited significant enhancements in 20-m speed (−7.4%, $d = 0.75$). Our research indicates that plyometric training significantly enhances physical fitness levels in young male soccer players when integrated with standard soccer training. Notably, the most substantial improvements in physical fitness were observed when plyometric exercises were performed prior to soccer-specific training sessions.

Moran, J., Blagrove, R. C. et.all. (2019); The aim of this meta-analysis was to evaluate the adaptability of male youth soccer players to small-sided games in comparison to traditional endurance training, as well as to formulate exercise prescription guidelines for this demographic. The data sources employed included Google Scholar, PubMed, and Microsoft Academic. Studies were deemed eligible for inclusion if they involved interventions with male soccer players under the age of 18 and compared the impacts of small-sided games and conventional endurance training on aerobic endurance performance. Small-sided games were characterized as modified soccer games played on smaller pitch areas, often with adjusted rules and fewer players than in standard games. Conventional endurance training was defined as continuous running or extensive interval training with work durations exceeding three minutes. The inverse-variance random-effects model was utilized for the meta-analysis, as it assigns a proportional weight to trials based on their individual standard errors and allows for analysis while considering heterogeneity among studies. Effect sizes were expressed as standardized mean differences and accompanied by 95% confidence intervals. A total of seven studies were included in this meta-analysis, with both training modalities proving effective in enhancing endurance performance. The effect sizes observed within the modes were of moderate magnitude, specifically for small-sided games at 0.82 (95% confidence interval 0.05, 1.60), $Z = 2.07$ ($p = 0.04$), and for conventional endurance training at 0.89 (95% confidence interval 0.06, 1.72), $Z = 2.10$ ($p = 0.04$). The differences in their effects on aerobic endurance performance were minimal, quantified as 0.04 (95% confidence interval −0.36, 0.43), $Z = 0.18$ ($p = 0.86$). Subgroup analyses indicated predominantly trivial differences between the two training methods concerning essential programming variables, including set duration (≥ or < 4 min) and

recovery intervals between sets (≥ or < 3 min). Programs extending beyond 8 weeks showed a preference for small-sided games, with an effect size of 0.45 (95% confidence interval −0.12, 1.02), Z = 1.54 (p = 0.12), while conventional endurance training exhibited a negative effect size of −0.33 (95% confidence interval −0.79, 0.14), Z = 1.39 (p = 0.16). Additionally, programs involving more than 4 sets per session favored small-sided games, yielding an effect size of 0.53 (95% confidence interval −0.52, 1.58), Z = 0.98 (p = 0.33), whereas those with 4 or fewer sets showed a trivial difference, with an effect size of −0.13 (95% confidence interval −0.52, 0.26), Z = 0.65 (p = 0.52). The findings suggest that small-sided games are equally effective as conventional endurance training in enhancing aerobic endurance performance among male youth soccer players. This is significant for practitioners, as it indicates that small-sided games can facilitate both endurance and skill training concurrently, thereby providing a more efficient training stimulus. It is recommended that small-sided games be conducted with two sessions per week, incorporating at least 4 sets of 4 minutes of activity, interspersed with 3-minute recovery periods for this demographic.

Paul, D. J., Marques, J. B., et.all. (2019); The objective of this study was to investigate the impact of an intensive period of soccer-specific training on the physical fitness of young players. A total of nineteen male soccer players from two teams participated, with a mean age of 16.2 years (± 0.8), body mass of 58.2 kg (± 7.6), and height of 170.8 cm (± 7.7). One team engaged in five days of small-sided games and high-intensity training (SSG & HIT; n = 12), while the other team followed a regular training regimen that included one day of SSG and HIT (REG; n = 7) each week for a duration of four weeks. The 30-15 intermittent fitness test (30-15 IFT), counter movement jump (CMJ), and change of direction (COD) performance were assessed both before and after the intervention. Heart rate (HR) and rating of perceived exertion (RPE) were recorded, and session load was calculated (RPE x minutes). The average percentage of maximum HR and session load were 83% and 344 AU for the SSG & HIT group, compared to 73% and 253 AU for the REG group (P< 0.05). The 30-15 IFT showed improvement in the SSG & HIT group (from 17.0 ± 1.1 to 18.4 ± 0.8 km/h; p< 0.05; ES =0.57), while no significant change was observed in the REG group (Pre: 17.9 ± 1.3, Post: 18.2 ± 1.6 km/h, ES=0.10). Both CMJ and COD performances remained unchanged in both groups, and no injuries were reported. The findings suggest that a concentrated four-week period of daily SSG & HIT is effective in enhancing endurance performance among youth soccer players, without resulting in injuries or negatively

affecting power and change of direction performance.

Malone, S, Hughes, B, and Collins, K. (2019); The present investigation assessed the effects of various exercise-to-rest ratios on hurling-specific small-sided games (SSG). A total of thirty-four (n = 34) hurling athletes were observed throughout an in-season training phase. Heart rate data (Polar Electro Oy, Kempele, Finland) and global positioning system technology (4-Hz; VX Sport, Lower Hutt, New Zealand) were employed to evaluate the physical and physiological variations associated with different exercise-to-rest ratios during SSG bouts. Metrics such as total distance (m), high-speed distance (m) (≥17 km·h−1), very high-speed distance (≥22 km·h−1) (m), total accelerations (n), acceleration distance (m), peak velocity (km·h−1), and percentage of maximum heart rate (%HRmax) were recorded. The exercise-to-rest ratios of 2:1 (d = 0.65 ± 0.12; moderate) and 1:1 (d = 0.43 ± 0.12; small) led to significant decreases in high-speed distance, very high-speed distance, and acceleration distance. Conversely, the ratios of 1:2 (d = 0.63 ± 0.21; moderate) and 1:3 (d = 1.23 ± 0.22; large) resulted in increased high-speed distance, very high-speed distance, and acceleration distance, but this was only observed after the third bout. The initial bout of SSG exhibited the lowest %HRmax in comparison to all subsequent bouts (d = 0.63 ± 0.22; moderate). A notable increase in %HRmax was recorded from bout to bout, regardless of the exercise-to-rest ratio (d = 0.25 ± 0.04; small). The ratios of 2:1 (d = 0.65 ± 0.14; moderate) and 1:1 (d = 0.65 ± 0.24; moderate) resulted in significantly elevated %HRmax across all SSG bouts; however, the ratios of 1:2 (d = 0.25 ± 0.04; small) and 1:3 (d = 0.15 ± 0.04; trivial) were associated with lower %HRmax during SSG.

Petisco, C., Ramirez-Campillo, R., et.all. (2019) ; The objective of this research was to evaluate the impact of varying intensities of warm-up conditioning on the physical fitness, specifically post-activation potentiation (PAP), of professional male soccer players. A total of ten athletes (mean age: 21.6 ± 3.2 years) participated in both a control warm-up and warm-ups designed to elicit PAP, administered in a random and counterbalanced sequence. Following the control and experimental warm-up sessions, participants performed a series of tests, including a triple hop test with both the dominant (H3Jd) and non-dominant (H3Jnd) legs, a squat jump (SJ), a countermovement jump (CMJ), a change of direction (COD) test, a repeated sprint with a COD (RSCOD) test, and a linear 30-meter sprint test (S-30). The control warm-up protocol was structured according to the athletes' standard warm-up routine. The experimental warm-ups incorporated the same exercises as the control, supplemented by

one set of half-back squats consisting of 10 repetitions at 60% of one-repetition maximum (1RM), 5 repetitions at 80% of 1RM, and 1 repetition at 100% of 1RM (60%-1RM, 80%-1RM, and 100%-1RM, respectively). Threshold values for Cohen's effect sizes (ES) were calculated for group comparisons. Notable improvements were observed in H3Jd (ES = 0.52), H3Jnd (ES = 0.51), COD (ES = 0.38), fasted sprint (RSCODb) (ES = 0.58), and total sprint time (RSCODt) (ES = 0.99) following the 80%-1RM protocol compared to the control warm-up. In contrast, the 100%-1RM and 60%-1RM protocols resulted in potentially poorer performance across all jump tests, COD, and RSCODb when compared to the control warm-up (ES ranging from −0.07 to −1.03 and −0.48 to −0.91, respectively). Furthermore, significant improvements were noted in all jump tests, COD, RSCODb, and RSCODt after the 80%-1RM warm-up protocol compared to the 100%-1RM and 60%-1RM protocols (ES ranging from 0.35 to 2.15).

Michailidis, Y., Tabouris, A., & Metaxas, T. (2019) ; The objective of this study was to determine whether integrating a soccer training session with plyometric training and change-of-direction (COD) exercises would yield greater improvements in soccer performance compared to training alone among youth soccer players. A total of thirty-one players, with an average age of 12 years (±0.8), were enrolled in the study. Participants were randomly assigned to one of two groups: a control group (CG, n = 14) and an intervention group (n = 17) that engaged in additional plyometric and COD training. The training program lasted for six weeks. Performance metrics, including sprint times (10 and 30 meters), countermovement jump, squat jump, long jump, multiple 5-bound, T-test, and the Yo-Yo Intermittent Endurance Test 1, were assessed before and after the intervention. Both groups exhibited improvements in acceleration, T-test, and long jump performance (P = .03, P = .002, and P = .001, respectively). Notably, the intervention group showed a significant increase in squat jump performance (15.2%, P = .003), while the control group experienced a slight decrease (P = .003). Significant differences were observed between the two groups in squat jump and long jump performances (P = .003 and P = .038, respectively). In conclusion, the findings suggest that a brief combined regimen of plyometric training and COD exercises can enhance jumping ability, acceleration, and endurance in youth soccer players. The modest training effects may be attributed to the participants' skill level, the program's duration, and the limited volume of COD exercises implemented.

Sparkes, W., Turner, A.,et.all. (2018) ; Responses related to neuromuscular, biochemical, endocrine, and mood factors following small-sided games training in

professional soccer were examined. The 24-hour effects of small-sided games (SSGs) soccer training were analyzed. A group of 16 professional soccer players engaged in SSGs (4 vs. 4 including goalkeepers; 6 sets of 7 minutes with 2 minutes of recovery between sets), during which performance metrics (peak power output [PPO] and jump height [JH]), physiological indicators (blood creatine kinase [CK], lactate, salivary testosterone, and cortisol), and mood assessments were recorded at baseline and at various intervals post-exercise (immediately; 0, +2, and +24 hours). The results indicated that for PPO and JH, there were potentially small to moderate decreases observed at the 0-hour mark (−1.1 W·kg−1; ±0.9 W·kg−1, −3.2 cm; ±1.9 cm, respectively), with values returning to baseline by +2 hours (trivial), followed by a decline at +24 hours (small to moderate effect) (−0.9 W·kg−1; ±0.8 W·kg−1, −2.5 cm; ±1.2 cm, respectively). Lactate levels showed a significant increase at 0 hours (likely large; +1.3 mmol·L−1; ±0.5 mmol·L−1), a decrease at +2 hours (likely small; −0.5 mmol·L−1; ±0.2 mmol·L−1), and returned to baseline by 24 hours (trivial). A modest increase in CK levels was observed at 0 hours (+97 µ·L−1; ±28 µ·L−1), which continued for an additional 24 hours (also modest; +94 µ·L−1; ±49 µ·L−1). There were potentially small elevations in testosterone levels at 0 hours (+20 pg·ml−1; ±29 pg·ml−1), followed by likely moderate reductions at +2 hours (−61 pg·ml−1; ±21 pg·ml−1), returning to baseline by +24 hours (trivial). In terms of cortisol, there were possibly small reductions at 0 hours (−0.09 µg·dl−1; ±0.16 µg·dl−1), succeeded by likely significant decreases at +2 hours (−0.39 µg·dl−1; ±0.12 µg·dl−1), which remained evident for 24 hours (likely small; −0.12 µg·dl−1; ±0.11 µg·dl−1). Mood disturbances were noted at 0 hours (likely moderate; +13.6 AU, ±5.6 AU) and at +2 hours (likely small; +7.9 AU; ±5.0 AU), returning to baseline by +24 hours (trivial). The movement demands associated with small-sided games (SSGs) lead to a bimodal recovery pattern in neuromuscular function, alongside fluctuations in physiological responses and mood lasting up to 24 hours. Therefore, it is advisable to periodize SSGs within the soccer training schedule throughout the competitive week, incorporating submaximal technical and tactical activities.

Hammami, A. Gabbett, et. all. (2018); This study sought to conduct a systematic review and meta-analysis of the training impacts of small-sided games (SSG) on physical fitness and specific skills pertinent to team sports, taking into account the level of play and the season's timeframe. The research encompassed several electronic databases, including PubMed, Google Scholar, and Science Direct, with a publication

search period extending from 2000 to 2016. The search utilized terms such as small-sided game, training, skill-based game, aerobic fitness, sprint, agility, jump, and team sports, either individually or in various combinations. Following the application of exclusion criteria and quality assurance measures, 16 articles were evaluated, of which 15 underwent meta-analysis, with standardized mean effects calculated using random effects models. The findings indicated that SSG training significantly enhanced maximal oxygen uptake [O2max] (effect size (ES) = 1.94; 95% CI 0.15, 3.74; I2 = 94%), agility (ES = -1.49; 95% CI -2.27, -0.71; I2 = 80%), and repeated sprint ability (ES = -1.19; 95% CI -2.17, -0.21; I2 = 53%). Additionally, moderate improvements were observed in 10- and 20-meter sprint performance (ES = -0.89; 95% CI -1.7, -0.07; I2 = 88%), jump height (ES = 0.68; 95% CI 0.03, 1.33; I2 = 79%), and intermittent endurance (ES = 0.61; 95% CI 0.17, 1.05; I2 = 0%). The results further indicated that SSG yielded more substantial positive effects on specific skills, such as endurance and agility tests, compared to generic or agility training. Thus, small-sided games may serve as an effective multi-component training strategy, promoting greater enhancements in specific skill tasks relative to interval or agility training, alongside moderate to large improvements in physical fitness related to team sports.

Sarmento, H., Clemente, F ,et.all. (2018); The objective of this paper was to conduct a systematic review and organization of the existing literature on small-sided games (SSGs) in soccer, with the aim of identifying the most commonly researched topics, characterizing the methodologies utilized, and outlining the progression of related research areas. A systematic review was carried out using the Web of Science, PubMed, and SportDiscus databases, adhering to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines. The search employed the keywords "football" and "soccer," each paired with terms such as "small sided games," "SSG," "drill-based training," "small sided," "conditioned games," and "position games." This search yielded 394 records, and after applying specific screening criteria, 77 manuscripts were selected for comprehensive review. The predominant topics of analysis included (1) pitch area; (2) player number: (a) with or without a goalkeeper; (b) with floater(s) either inside or outside the pitch; (3) goal-related factors: (a) goal versus scoring zone; (b) number of goals; (c) goal size; (4) modifications to rules or task constraints: (a) number of ball touches; (b) offside rule; (c) other variations; (5) training regimen; and (6) coach encouragement. This review offers significant insights into the intricate relationships among technical, tactical, and physiological interactions in SSGs,

as well as how the manipulation of these variables can enhance the soccer training process.

Garcia-Ramos, A., Haff, G. G et.all. (2018); Physical performance plays a crucial role in the various actions that contribute to success in soccer competitions. This meta-analysis sought to evaluate the effectiveness of different conditioning programs, when combined with standard soccer training, in improving performance in high-velocity soccer-related tasks. The study participants were divided into groups based on the type of performance metrics assessed: (A) vertical jump capability, (B) linear sprinting efficiency, (C) change of direction while dribbling, (D) change of direction without the ball, (E) repeated sprinting capacity, and (F) kicking proficiency. Subgroup analyses were conducted according to the type of conditioning regimen employed: (A) resistance training, (B) plyometric exercises, (C) sprinting and/or directional change drills, and (D) combined training methods. Standardized mean differences (SMD) along with 95% confidence intervals (95% CI) were computed using Review Manager 5.3 software. The findings indicated that the incorporation of a conditioning program led to significant enhancements in vertical jump ability (SMD = 0.64 [95% CI: 0.50–0.77]), linear sprinting (SMD = −0.79 [95% CI: −0.61 to −0.96]), change of direction with the ball (SMD = −0.78 [95% CI: −0.42 to −1.15]), change of direction without the ball (SMD = −0.83 [95% CI: −0.61 to −1.05]), repeated sprinting ability (SMD = −0.51 [95% CI: −0.19 to −0.84]), and kicking performance (SMD = 0.78 [95% CI: 0.34–1.22]). However, no significant differences were noted among the various conditioning programs. Overall, the addition of a conditioning program to regular soccer training significantly enhances the performance of high-velocity soccer-related tasks.

Asier Los Arcos[1], Juan Sebastián Vázque[2] (2015) compared the effects of Small-Sided Games (SSG) *vs*. Interval Training (IT) in soccer training on aerobic fitness and physical enjoyment in youth elite soccer players during the last 8 weeks of the season. Seventeen U-16 male soccer players (age = 15.5 ± 0.6 years, and 8.5 years of experience) of a Spanish First Division club academy were randomized to 2 different groups for 6 weeks: SSG group (n = 9) and IT group (n = 8). In addition to the usual technical and tactical sessions and competitive games, the SSG group performed 11 sessions with different SSGs, whereas the IT group performed the same number of sessions of IT. Players were tested before and after the 6-week training intervention with a continuous maximal multistage running field test and the counter movement

jump test (CMJ). At the end of the study, players answered the physical activity enjoyment scale (PACES). During the study, heart rate (HR) and session perceived effort (sRPE) were assessed. SSGs were as effective as IT in maintaining the aerobic fitness in elite young soccer players during the last weeks of the season. Players in the SSG group declared a greater physical enjoyment than IT (P = 0.006; ES = 1.86 ± 1.07).

Marco Aguiar[1] Goreti Botelho[2] (2012) conducted a study on review on the Effects of Soccer Small-Sided Games Over the last years there has been a substantial growth in research related to specific training methods in soccer with a strong emphasis on the effects of small-sided games. The increase of research in this topic is coincident with the increase of popularity obtained by specific soccer conditioning, which involves training players to deal with soccer match situations. Given the limited time available for fitness training in soccer, the effectiveness of small-sided games as a conditioning stimulus needs to be optimized to allow players to compete at the highest level. Available studies indicate that physiological responses (e.g. heart rate, blood lactate concentration and rating of perceived exertion), tactical and technical skill requirements can be modified during small-sided games by altering factors such as the number of players, the size of the pitch, the rules of the game, and coach encouragement. However, because of the lack of consistency in small-sided games design, player fitness, age, ability, level of coach encouragement, and playing rules in each of these studies, it is difficult to make accurate conclusions on the influence of each of these factors separately.

Stephen V. Hill-Haas, Brian Dawson (2011) conducted a systematic review on Physiology of small-sided games training in football. The research made a conclusion that These games are less structured than traditional fitness training methods but are very popular training drills for players of all ages and levels. In general, it appears that SSG exercise intensity is increased with the concurrent reduction in player number and increase in relative pitch area per player. However, the inverse relationship between the number of players in each SSG and exercise intensity does not apply to the time-motion characteristics. Consistent coach encouragement can also increase training intensity, but most rule changes do not appear to strongly affect exercise intensity. The variation of exercise intensity measures are lower in smaller game formats (e.g. three vs three) and have acceptable reproducibility when the same

game is repeated between different training sessions or within the same session. The variation in exercise intensity during SSGs can also be improved with consistent coach encouragement but it is still more variable than traditional generic training methods. Other studies have also shown that SSGs containing fewer players can exceed match intensity and elicit similar intensities to both long- and short-duration high-intensity interval running. It also appears that fitness and football-specific performance can be improved equally with SSG and generic training drills.

Athanasios Katis (2009) conducted a study on Effects of Small-Sided Games on Physical Conditioning and Performance in Young Soccer Players. The researcher examined, first, the movement actions performed during two different small-sided games and, second, their effects on a series of field endurance and technical tests. Thirty-four young soccer players (age: 13 ± 0.9 yrs; body mass: 62.3 ± 15.1 kg; height: 1.65 ± 0.06 m) participated in the study. Small-sided games included three-a-side (3 versus 3players) and six-a-side (6 versus 6 players) games consisting of 10 bouts of 4 min duration with 3 min active recovery between bouts. Soccer player performance was evaluated using five field tests: a) 30m sprint, b) throw-in for distance, c) Illinois Agility Test, d) dribbling the ball and e) horizontal jump before, in the middle and after the implementation of both game situations. Heart rate was monitored during the entire testing session. Each game was also filmed to measure soccer movements within the game. The ANOVA analysis indicated that the three-a-side games displayed significantly higher heart rate values compared with the six-a-side games ($p < 0.05$).

Chapter III

Methodology

In this chapter, the procedure adopted for conducting the research study, selection of subjects, selection of variables, criterion measures, procedure of collection of data and statistical technique has been described.

Selection of Subjects

To successfully complete the study, 40 female national soccer players from Lakshmibai National Institute of Physical Education, Gwalior, will be selected through purposive sampling. After that , 30 subjects will be selected from the above population (40) by conducting 12 Minute cooper's run/walk by eliminating the first five and the last five subjects to maintain the normality in data. The study's subjects ranged in age will be from 18 to 25 years. Consent will be taken from each participant. These subjects will be equally divided into two experimental groups i.e. 15 subjects (experimental group 1) and 15 subjects (experimental group 2) by systematic sampling.

Selection of Variables

The following variables will be selected for this study**:**

A. Physical fitness:

i. Speed

ii. Agility

iii. Endurance

iv. Strength

v. Power

B. Physiological variables:

i. Vo2 Max

ii. Vital capacity

CRITERION MEASURES

Physical fitness variables

Speed - 10 meter, 20 meter and 30 meter sprint will be performed by the players.

Agility- Illinois agility test will be conducted to measure the agility ability of the players.

Endurance- 12minute cooper run test.

Power - Sargent jump test will be performed to measure the lower limb power of the players.

Physiological variables

Vo2 max - YO - YO Intermittent recovery test level 1 will be conducted on the players.

Vital capacity- vital capacity will be measured with the help of dry Spiro- meter.

Reliability of Data

Reliability of data will be ensured by establishing the instrument reliability, tester reliability, reliability of test and subject reliability.

Collection of Data

The subjects will be accustomed to the tests' method prior to the data collection. They will also be given step-by-step instructions so they could perform at their best on the test. Although no incentive techniques will be used in the study, participants will be encouraged to give the tests their best effort. The tests will be conducted in the morning to guarantee consistent conditions for every participant.

Training Protocol

The eight-week training program will be created with a focus on the need for female soccer players between the ages of 18 and 25 to improve certain physiological and physical fitness metrics. The experimental group 1 will receive small-sided based conditioning and experimental group 2 will receive general conditioning. There will be a set number of repetitions for each exercise in the timetable, and each exercise will be completed according to the recommended amount of repetitions. For eight weeks, both training sessions will be conducted five days a week, Monday through Friday.

Schedule of small-sided game based conditioning

Day	**Warm-Up (10 min.)**	**Main Drills (40 min.)**	**Limbering down (10 min.)**
Day 1	Light jogging (1 Min.) Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	- 1v1 Dribbling Challenge (5 Min.) - 2v1 Possession play (5 Min.) 6v4 + Goalkeeper (30 Min.)	Walking Dynamic exercises Static stretching Flexibility exercises Meditation

Day	Warm-Up (10 min.)	Main Drills (40 min.)	Limbering down (10 min.)
Day 2	Light jogging (1 Min.) Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	- 2v2 Passing (15 Min.) - 4v4 + 4 neutral player (25 Min.)	Walking Dynamic exercises Static stretching Flexibility exercises Meditation
Day 3	Light jogging (1 Min.) Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	- 3v3 with finishing the goal (20 Min.) - 6v6 + goalkeeper match (20 Min.)	Walking Dynamic exercises Static stretching Flexibility exercises Meditation
Day 4	Light jogging (1 Min.) Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	- 6v3 (15 Min.) - 7v7 Transfer game (25 min.)	Walking Dynamic exercises Static stretching Flexibility exercises Meditation
Day 5	Light jogging (1 Min.) Running variations	- 2v2 + targets (10 Min.) -Quick play and	Walking Dynamic exercises Static stretching

Day	Warm-Up (10 min.)	Main Drills (40 min.)	Limbering down (10 min.)
	(2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	pressing (30 Min.)	Flexibility exercises Meditation

Schedule of General conditioning

Day	Warm-Up (10 min.)	Main Drill (40 min.)	Limbering down (10 min.)
Day 1	Light jogging (1 Min.) Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	- Slow Continuous Running (Steady Pace)	Walking Dynamic exercises Static stretching Flexibility exercises Meditation
Day 2	Light jogging (1 Min.) Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	- Circuit training (Bodyweight Exercises)	Walking Dynamic exercises Static stretching Flexibility exercises Meditation
Day 3	Light jogging (1 Min.) Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	- Agility drills with ladder and cone - Speed Drills	Walking Dynamic exercises Static stretching Flexibility exercises Meditation
Day 4	Light jogging (1 Min.)	- Plyometric	Walking

Day	Warm-Up (10 min.)	Main Drill (40 min.)	Limbering down (10 min.)
	Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	training	Dynamic exercises Static stretching Flexibility exercises Meditation
Day 5	Light jogging (1 Min.) Running variations (2 Min.) Stretching & Mobility (3 Min.) Specific exercises (4 Min.)	Interval training	Walking Dynamic exercises Static stretching Flexibility exercises Meditation Stretching

Administration of Test

1. Speed: 30 m Sprint

Purpose: To determine speed of athletes.

Equipment required: speed gun, markers, measuring tape and cone.

Procedure: This test consists of running a solo sprint over a predetermined distance, with time recorded. Following a predetermined warm-up, the test is performed across a distance of 30 meters. Starting position will be consistent, starting from a fixed position behind the starting line and no movements. Time will be restrained to tenths of a second using a stopwatch, the time will be considered as the score of the subject.

Scoring: The time will be used to determine the participants' scores.

2. Agility: Illinois Agility test

Purpose: To test the agility.

Equipment required: stopwatch, marking cones, flat non-slip surface, and measuring tape.

Procedure: The test consists of run, a single maximal sprint, over a predetermined distance, with time recorded. Following a predetermined warm-up, the test will be performed across a distance of 30 meters. The starting position will be fixed, starting

from initial position with foot behind the starting line. Time will be measured in tenths of a second using stopwatch, and the time will be considered as their score.

Score : Their score will be based on timing.

3. Endurance: 12 minute Cooper's run/walk test

Purpose: To measure Endurance

Equipment required: Score sheet, whistle, wooden clapper, and stop watch

Procedure : The subject will be positioned behind the 400-meter track's starting line for the running space. To make it easier to measure the distance run by the subject, the running space will be divided into sixteen equal sections. The participants will split up into two groups, with one partner from each group. Each student from the other group's companion will measure the distance their partner covered during a 12-minute run or walk while the subjects will be forced to run in their respective groups. The rate will be initiated with the sound of the clapper, and they will be given a standing start. The participants will give it their all over a 12-minute run, with a lengthy whistle at the conclusion of the run. To the closest twenty-five meters, the distance will be measured. For the subsequent set of individuals, the identical protocol will be used.

Scoring: The data will consist of the distance travelled in a 12-minute period.

4. Strength: Standing broad jump

Purpose: to measure the explosive power of the legs

Equipment required: measuring tape, non-slipping floor and easy-going landing area

Procedure: The subjects places their feet at shoulder level and stands beside the line drawn on ground. To produce forward momentum, the arms are swung and the knees bent during a two-foot take-off and landing. The participant will aims to leap while landing on both feet and avoiding a backward tumble.

Scoring: The score will be the distance covered to the point of touch on the touching site. Set a record for the distance leaped in three attempts and consider the maximum jumped as the score.

5. Power: Seargent jump

Purpose: The purpose was to record the leg muscle power

Equipment required: measuring tape and chalk that will be used for marking wall

Procedure: The subjects will stand sideways against a wall and reaches to as much height as possible. The feet should be flat on the ground, mark or record the final reach of the fingers. The athlete would have to stands little away from the marked wall that would

be used to measure leg muscle power and jumps vertically as much as she can, utilizing whole body to help propel the body aloft. The subjects will try as best as she can to jump and reach the wall.

Scoring: The score will be calculated as the variance in distance reached between the standing height and jump height. The best jump out of three tries will be recorded as the score.

6. Vo2 Max: Yo-Yo Intermittent recovery test

Purpose: To evaluate Vo2 Max

Equipment required: Marking cones, Non-slipping surface, beep test audio, music player, 20 m measuring tape and recording sheets.

Procedure: The test consists of running continuously between the distance of two lines i.e., 20 m in time to recorded sounds. For this reason, the exam is called as 'beep' or 'bleep' test. This test required participants to stand beside the line facing the other line, and start running when prompted by the audio. The speed at the beginning is fairly slow. The subject will run between the two lines, turning as indicated by beeps. Roughly a minute after, an increase in speed will be given by sound signals, and the beeps become closer together. The repetition will be done at each level in every minute. The subject must wait until the beep sounds before proceeding at every level. The subject will be given a warning if the subject will not be able to reach before the beeping of sound and instructed to continue running to the line before turning and attempting to cover up with the time and sound in two more 'beeps'. The test must finish if the participant fails to cover the line for two consecutive ends with a warning.

Scoring: The level and number of shuttles (20m) completed before falling behind the recorder will be determined as the score. The last level finished was recorded (not the level where you stopped).

7. Vital Capacity: Dry Spirometer

Purpose: To measure Vital capacity

Equipment required: Dry Spirometer and recording sheets.

Procedure : Allow the participant to become familiar with the spirometer. Demonstration will be given for the correct way to use the device, including how to create a tight seal around the mouthpiece. Ensure that the spirometer is clean and properly calibrated according to the manufacturer's instructions. Instruct the participant to sit comfortably on a chair with an upright posture. Ensure that their feet are flat on the floor. Provide a mouthpiece and instruct the participant to create a tight seal around

it with their lips. Instruct the participant to take a few normal breaths to become accustomed to the mouthpiece and to relax. Ask the participant to take a deep breath and then exhale as forcefully and completely as possible into the spirometer. Ensure that the exhalation is continuous and lasts for as long as possible. Record the vital capacity value displayed on the spirometer. This value represents the maximum volume of air the participant can exhale after a maximal inhalation. Allow the participant to rest for a brief period, and then repeat the test to ensure consistency. The best of three trials will be recorded.

Scoring: The recorded vital capacity value is typically expressed in liters or milliliters. Reference values based on age, sex, and other factors may be used to interpret the results and identify any deviations from the expected range.

Statistical Technique

Microsoft Excel will be used to compute the descriptive statistic. The effect of both trainings on specific physical fitness and physiological characteristics of female soccer players at Lakshmibai National Institute of Physical Education, Gwalior, will be determined by analysing the data using the t-test (dependent). In every instance, the significance level will be set at 0.05.

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